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Weed Management in Cotton Planted into Wheat Residue

Misha Manuchehri
Extension Weed Specialist

Seth Byrd
Extension Cotton Specialist

Todd Baughman
Professor of Weed Science

Introduction

As herbicide-resistant weeds increase, a push continues for crop managers to integrate multiple weed management strategies. One practice Oklahoma cotton growers incorporate is the planting of a winter cover, like wheat, to provide suppression of weeds and soil erosion. Winter wheat planted in the fallow period also can provide winter forage. A second strategy is the incorporation of preemergence (PRE)/residual herbicides to alleviate pressure placed on postemergence (POST) products. When PRE herbicides are part of a chemical weed control plan, the number of herbicide active ingredients and herbicide sites of action increases, ultimately reducing the selection pressure placed on weeds by certain herbicide active ingredients and sites of action.

One challenge with PRE herbicides is that some labels caution that efficacy could be reduced in fields with heavy residue, resulting in limited herbicide to soil contact. Due to these warnings, one could worry about the effectiveness of the PRE herbicides in moderate to heavy residue systems or might even choose to avoid residual herbicides. To evaluate this idea, a project was conducted during the 2020 cotton growing season in Stillwater to assess herbicide systems in cotton that followed a terminated winter wheat cover (Figure 1).

Figure 1. Trial site in Stillwater, three weeks after planting.

Field Research Findings and Recommendation

The winter wheat cover was planted on at 60 pounds per acre and terminated six weeks prior to planting cotton on June 2, 2020 at 34,200 seed per acre. Preemergence herbicides were applied shortly after planting and were incorporated using overhead irrigation. Due to timely incorporation, all PRE herbicides were effective against target weed species (Palmer amaranth, large crabgrass, carpetweed and ivyleaf morningglory). Herbicide systems are described in Table 1. No stand loss was observed following any herbicide treatment (data not shown).

Nearly five weeks after application of PREs and one week after application of the first early POST treatments, overall weed control was 87% or higher for all treatments against all weed species (Figure 2). For carpetweed, all treatments provided 97% control or greater except for Warrant® and Dual® (93%). For ivyleaf morningglory, all treatments provided at least 97% control except Prowl H_2O. For Palmer amaranth, applying Roundup® + XtendiMax® or Liberty® early POST (no PRE) was similar to PRE treatments of Warrant®, Caparol®

Table 1. Herbicide systems and application dates.

Preemergence 6/4/2020	*Early postemergence I 7/9/2020*	*Early postemergence II 7/21/2020*	*Mid-postemergence* 8/5/2020
-	Roundup® + XtendiMax®	-	-
-	Roundup® + XtendiMax®	-	Liberty®
-	Liberty®	-	Roundup® + XtendiMax®
Warrant®	-	Roundup® + XtendiMax®	-
Warrant®	-	Roundup® + XtendiMax®	Liberty®
Warrant®	-	Liberty®	Roundup® + XtendiMax®
Caparol®	-	Roundup® + XtendiMax®	-
Caparol®	-	Roundup® + XtendiMax®	Liberty®
Caparol®	-	Liberty®	Roundup® + XtendiMax®
Diuron®	-	Roundup® + XtendiMax®	-
Diuron®	-	Roundup® + XtendiMax®	Liberty®
Diuron®	-	Liberty®	Roundup® + XtendiMax®
Dual®	-	Roundup® + XtendiMax®	-
Dual®	-	Roundup® + XtendiMax®	Liberty®
Dual®	-	Liberty®	Roundup® + XtendiMax®
Staple®	-	Roundup® + XtendiMax®	-
Staple®	-	Roundup® + XtendiMax®	Liberty®
Staple®	-	Liberty®	Roundup® + XtendiMax®
Prowl® H_2O	-	Roundup® + XtendiMax®	-
Prow® H_2O	-	Roundup® + XtendiMax®	Liberty®
Prowl® H_2O	-	Liberty®	Roundup® + XtendiMax®

or Diuron®. Dual® and Prowl® applied PRE provided the least Palmer amaranth control (94%). For large crabgrass, all early post treatments, Dual® and Prowl were the most effective (96% to 98%) while Caparol® and Diuron® were the least effective (91%).

Almost two weeks after the early POST treatments were applied in the POST only systems, early POST herbicides followed the PRE systems as they were starting to break. The trial was then rated again one month after this application for overall weed control. All systems were similar (97% to 99% control) except for Liberty® applied alone (90% control) (Figure 3). However, by the end of the season, once mid-POST treatments were applied, all plots achieved 99% control and no treatment differences were observed for seed cotton yield (data not shown).

In summary, effective PRE herbicides were identified in our study, despite heavy wheat residue. The integration of a PRE herbicide at planting also delayed the first POST application by two weeks vs. POST only systems where weed size demanded an earlier application. This delay provides producers some flexibility regarding their first POST application. Finally, although POST only systems typically achieved high levels of weed control, it is important to keep in mind these systems are only short-term weed management strategies that will eventually select for herbicide-resistant weed biotypes. At the field location, little herbicide resistance was present with the exception for glyphosate-resistant Palmer amaranth. Lastly, it is important to note that POST treatments were applied at the recommended timing while weeds were small (2 inches to 6 inches in height).

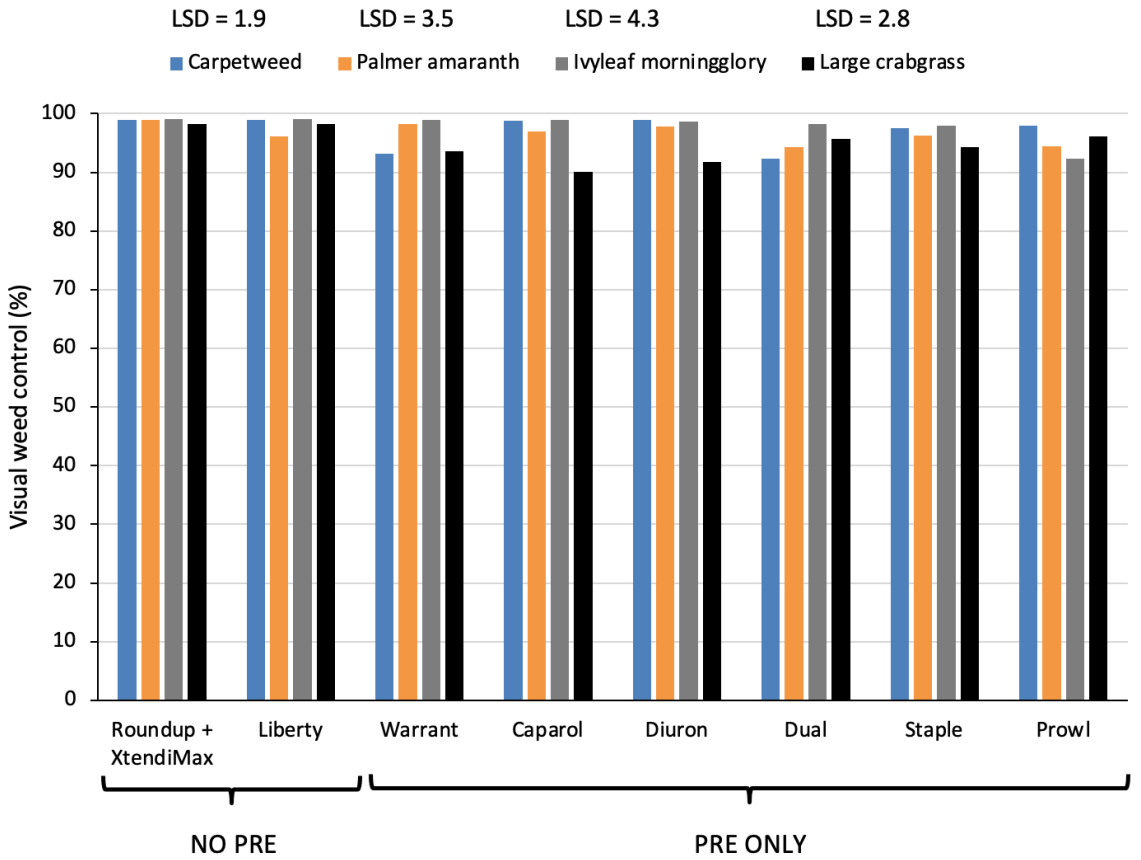

Figure 2. Carpetweed, Palmer amaranth, ivyleaf morningglory and large crabgrass control five weeks after application of PREs and one week after application of early POST treatments in POST only systems.

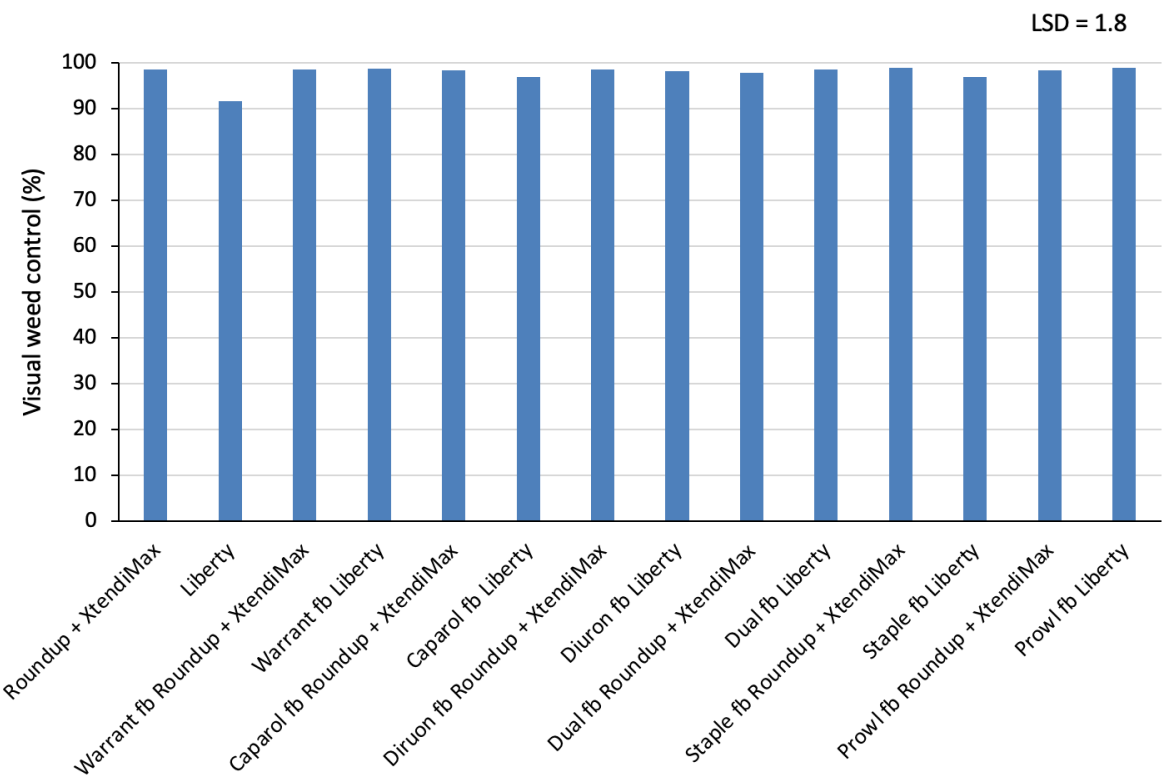

Figure 3. Overall weed control four weeks to six weeks after early POST treatments. Fb = followed by.

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